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(19) (CA) **CANADIAN PATENT** (12)

(54) Framework for Greenhouse Bench Top

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# ABSTRACT

The invention provides a greenhouse bench having a bench top and a scaffold to support the bench top in an elevated position relative to the floor upon which the bench is to be erected in use, the bench top including a supporting deck and the framework being shaped to surround the supporting deck, the framework comprising an upright portion forming sides with a smooth exterior surface for the bench top and adapted to shield the bench top; and ledge means defining a support surface to support the periphery of the deck and defining a locating surface to locate a plurality of beams bridging the framework and providing respective bearing surfaces for support of the bench top on the scaffold.

In a preferred embodiment, the ledge means comprise at least two spaced ledges, an upper one of which defines said support surface and a lower one of which defines said locating surface, the spacing between the ledges being sufficient to accomodate between the deck and the beams, means for heating plants. The ledge means and the upright portion may also define channels for receiving the ends of the beams and/or the periphery of the deck.

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FRAMEWORK FOR GREENHOUSE BENCH TOP

Field of the Invention

5 This invention relates to frameworks for bench tops of benches used in greenhouses for supporting plants and the like above ground level. In particular, the invention relates to a framework for a bench top for a bench of the kind in which the bench top is slidably supported above the greenhouse floor on a  
10 suitable supporting scaffold. Such a scaffold may comprise, for example, a set of upright stands with horizontal cross-bars aligned in hurdle-like manner, two or more rollers, each of a length sufficient to bridge the stands, being interposed between the stand cross-bars and the bench top. In use, such a bench  
15 top may be moved transversely relative to the stands by rolling it on the rollers, and consequently is known in the industry as a "rolling bench".

Background to the Invention

15 It has long been recognized that controlled climatic conditions are desirable to propagate plants and promote their growth. In particular, it is advantageous to control the amount of light the plant receives, the ambient temperature, and humidity. Such control is commonly provided in closed or closable structures called greenhouses. For the convenience of  
20 the greenhouse keeper or worker raised plant beds and bench tops have been provided which approximate the height of an average

person's hip, thus obviating the need to crouch or bend over while tending the plants. In commercial operations, it is particularly desirable to maximize use of available floor area, and "rolling benches" as described above are becoming increasingly popular. In a typical installation, a plurality of rolling benches are placed side by side so as to extend over substantially the entire width of a greenhouse floor, leaving only sufficient space to provide a minimum of access aisles between them. In use, the aisle or aisles are produced as required between adjacent bench tops or between one top and an adjacent wall by rolling the bench tops on their respective rollers.

To facilitate these movements of the bench top, it is evident that the construction materials should be as light as possible while still providing sufficient strength and stability in the deck to adequately support plants carried thereon. A standard construction for such bench tops is a rectangular framework shaped to surround a deck, and expanded metal sheet is an ideal material for use as such a deck because of its high strength to weight ratio. Unfortunately, the edges of expanded metal sheet are rough and very sharp and are easily caught in the clothing of greenhouse personnel and may also cause injury.

Another development of increasing interest in the greenhouse industry is heating the base of growing plants to promote rootgrowth. Some heating systems use circulating hot water to distribute heat and comprise a set of tubular conduits which form an array that spans the width and length of the bench. The conduits are supported on a deck made of expanded

metal sheet and are secured to the top of the deck at regular intervals along their length. The conduits occupy space on the deck and therefore limit the space available. Consequently, there is a tendency for the users to place the pots over the conduits or between pairs of adjacent conduits. In the former situation, there is a risk with large and heavy pots of them crushing the conduits and consequently restricting water flow; with small pots, there is a risk that they are inadequately supported and may topple over. In the latter situation, the placing of pots between conduits can be very laborious and may result in a number of conduits being crowded together to accomodate a large pot; the heating system is then inefficient as the root area of the potted plants is not heated uniformly.

It is thus an object of the invention to provide a framework shaped to surround the deck of a greenhouse bench top which is adapted for use in so-called rolling benches and which will accomodate a circulating hot water system for heating the base of potted plants without encumbering the deck.

It is also an object to provide such a framework which is easy to install, light, stable and strong and with which the likelihood of any injury to greenhouse workers or of damage to their clothing from the bench top is minimized.

#### Summary of the Invention

According to the invention there is provided a greenhouse bench having a bench top and a scaffold to support the bench top in an elevated position relative to the floor upon

which the bench is to be erected in use, the bench top including a supporting deck, and the framework being shaped to surround the supporting deck, the framework comprising:

an upright portion forming sides with a smooth exterior surface for the bench top and adapted to shield the bench top; and

ledge means defining a support surface to support the periphery of the deck and defining a locating surface to locate a plurality of beams bridging the framework and providing respective bearing surfaces for support of the bench top on the scaffold.

#### Description of the Drawings

A preferred embodiment of the invention is described below by way of example only and with reference to the accompanying drawings in which:

Fig. 1 is a schematic perspective view of a greenhouse floor on which a plurality of greenhouse benches employing the invention have been erected;

Fig. 2 is an end-on view looking down the length of the benches of Fig. 1;

Fig. 3 is an enlarged exploded view of a circled area 3 in Fig. 1, illustrating the assembly of a scaffold stand and an overlying roller for supporting a bench top;

Fig. 4 is a schematic perspective view illustrating a single bench top;

Fig. 5 is an enlarged exploded view of a circled area 5

in Fig. 4, illustrating a corner of a framework according to the invention for encasing the deck of a bench top;

Fig. 6 is a cross-sectional view taken along line 6-6 of Fig. 4, illustrating an application of the framework in which a securement strip for locating water conduits is accommodated below the deck; and

Fig. 7 is a cross-sectional view similar to Fig. 6, illustrating another application of the framework in which the deck periphery is confined between adjacent ledges of the framework.

#### Description of the Preferred Embodiments

Referring firstly to Figure 1, there is illustrated a typical commercial installation comprising plurality of "rolling benches" erected adjacent one another, generally indicated by the numeral 20. Each bench comprises a scaffold 22 which supports a respective bench top 24. The scaffolds 22 are erected so as to support the bench tops 24 in a juxtaposed relationship at a height above the greenhouse floor which approximates the height of an average person's hip. The benches extend over substantially the entire width of the greenhouse floor, leaving only enough space for a minimum of temporary access aisles to be locatable between them. In the installation illustrated, there is width for only one access aisle 31 and it is shown in Figure 1 as located between adjacent benches 33, 34.

If a new access aisle 35 is to be created, for example, between benches 32 and 33, the top of bench 33 is rolled toward

bench 34, as indicated by arrow 36 in Fig. 2. Once a gap is created, it may be widened into an aisle by pushing against the bench tops that will border on the aisle, as indicated at arrows 36 and 37.

5           The structure of an individual bench will now be described. Each scaffold 22 includes a set of longitudinally-spaced upright stands 38 aligned with each other in hurdle like manner i.e. with these cross-bars all accurately horizontal and parallel to one another. A detail of a preferred  
10 stand construction is shown in Fig. 3. The stands comprise hollow square cross-section bars 40 of galvanized steel mounted at right angles to one another and held together by brackets 42 fastened with bolts 44 washers 46 and nuts 48 or by other suitable fasteners, for example, slot screws and nuts.  
15 Alternatively, the bars may be positioned with their respective edges flush with one another for fastening with angle irons and bolts. Each scaffold has mounted thereon a pair of rollers 30, each of a length sufficient to bridge all of the stands 38 of the set and also span the length of the respective bench top.  
20 Each bench top 24 comprises a deck 26 for supporting plants 27 thereon and a framework 28 which surrounds its periphery. As shown in Fig. 4, the deck 26 is preferably made of expanded metal sheet trimmed to a rectangular shape.

25           Referring specifically to the enlarged illustration of Fig. 5, the framework 28 comprises elongated edge members each provided with ledge means including three spaced horizontal ledges 50, 52, 54 lying in respective parallel planes and extending at right angles from upright portions 56 thereof, the



edge members thereby forming sides for the bench top 24. The upper ledge 50 is spaced downwardly from the operatively upper end of the upright portion 56; the lowermost ledge 54 is flush with the operatively lower end of the upright portion 56; and the intermediate ledge 52 lies between the other two.

The framework 28 is conveniently assembled from aluminium extruded sections of suitable length for modular assembly of the framework. Adjoining sections 57 of the framework are joined together along the sides by straight splicers 58, and at the corners by corner splicers 60. The splicers are L-shaped in vertical cross-section and have a return lip 62 provided at each end of the "L" so as to hold captive the operatively upper end of the upright portion 56 and the outer free end of the lowermost ledge 54 of a section that has been inserted therein. The sections are fastened, as required, by means of self-tapping screws 66 located to penetrate the lowermost ledge 54.

A first application of the framework will now be described with reference to Fig. 6. In this structure, the upper ledge 50 constitutes a support surface to support the periphery of the deck 26 which is secured to the upper surface of the upper ledge 50 by means of self tapping screws 68 located at regular intervals along the deck periphery. The upper end of the upright portion 56 borders the deck and shields the operator against contact with the sharp edges of the deck.

The second or intermediate ledge 52 constitutes a locating surface to locate a transverse beam 70 which bridges the framework 28 across the width of the deck 26. With the

bench top mounted in place, the beams 70 bear on the rollers 30 and provide suitable smooth bearing surfaces, so that the bench top may be moved by pushing or pulling the associated framework 28. Each beam 70 is made of square cross-section galvanized steel tubing and is spaced from adjacent beams at intervals of approximately 61 cm (2 feet). The ends of the beams 70 are secured at their operatively upper surfaces to the intermediate ledge 52 by means of self tapping screws 71. Conveniently, the intermediate ledge 52 is made wider than the upper ledge 50, thereby facilitating insertion of the screws 71 from above.

The lowermost ledge 54, the intermediate ledge 52, and the intervening part of the upright portion 56 together define a channel dimensioned to accomodate the ends of the beams 70 with the upright portion shielding the end of the beam and providing a smooth exterior surface. The beams 70 are made sufficiently deep, so that the lowermost surface of the ends of the beams rest on the lowermost ledge 54, and thereby are given additional support.

The upper and intermediate ledges provide a space between them, and by locating the beam 70 against the intermediate ledge 52, this space is available beneath the deck 26 to accomodate heating means for the plants. Thus, a plurality of positioning strips 72 for locating hot water conduits 74 and spacing them apart is placed between the deck 26 and the beams 70. Each positioning strip 72 is about one foot long (30cm) and a plurality of these are butt jointed to span the width of the bench top 24 between opposite intermediate ledges 52, and are secured to the underlying beam 70 by means of

self tapping screws 76. The thickness of the strips and the spacing between the upper ledge 50 and the intermediate ledge 52 are such that the deck 26 will abut the top surface of the positioning strips 72, and thus be supported by the beams 70 located below.

In a typical installation, each stand 38 has a width of approximately 1.4m to 1.5m (4.5 to 5 feet), and the stands are spaced approximately 1.5m (5 feet) apart with the scaffold extending approximately 15m (50 feet). The rollers 30 comprise hollow galvanized steel tube pipe having a diameter of approximately 3.2cm (1 1/4 inch).

In use, a set of stands 38 for each bench is carefully aligned and erected to form a scaffold 22. Conveniently, a laser transit may be used to align the vertical or upstanding bars 40 of the stands 38 so that they lie in parallel planes and have the same height. The stands 38 are set in or on concrete by means of foot anchors fastened to the concrete which is configured so as to serve as foot paths between benches and the process is repeated according to the number of benches required.

To assemble a bench top 24, appropriate sections 57 of a framework 28 are spliced together and the beams 70 are secured to the intermediate ledges 52 of the framework. The partially assembled framework 28 is then placed over the stands 38 with the rollers 30 placed in between and additional pieces of the framework are added on until the framework is complete and spans the length of the stands with some room to spare at either end. Securement strips 72 are then fixed to the beams 70 and the water conduits 74 arranged where required. Finally, the deck 26

is installed.

Clearly the assembly of the bench top using a framework according to the invention is very simple and the resulting structure is stable as well as light in weight. The surrounding border provided by the upright portion 56 has a smooth exterior which prevents clothing and the like from catching on exposed decks or beams. Water conduits for heating the bases of plants are secured below the deck and the deck has an unobstructed surface for supporting plants.

A second application of the framework is illustrated in Fig. 7 where a system of positioning strips and water conduits is not required. Here, the periphery of the deck 26 is located in the space between the upper ledge 50 and the intermediate ledge 52, so that it is received in a channel. The central portion of the deck between opposite intermediate ledges will sag under its own weight and the weight of the pots, and is supported directly on the beams 70. Because the deck is held captive between the ledges 50, 52, it is unnecessary to fix it by means of any screws or the like. However, self tapping screws 78 may be used to secure the ends of the beams to the lower ledge 54.

In a second embodiment illustrated in ghost outline in Figure 6, an auxiliary ledge 80 is provided above the upper ledge 50 for enclosing the edges of the deck 26, so that again screw fastening is not required.

It will be understood that several variations may be made to the above described embodiments of the invention without departing from the claimed scope thereof.

WE CLAIM:

1. In a greenhouse bench having a bench top and a scaffold to support the bench top in an elevated position relative to the floor upon which the bench is to be erected in use, the bench top including a supporting deck and a plurality of beams bridging the bench top to provide respective bearing surfaces for support of the bench top on the scaffold, the improvement in which a framework shaped to surround the deck comprises:

an upright portion forming sides with a smooth exterior surface for the bench top and adapted to shield the bench top; and

ledge means defining a support surface to support the periphery of the deck and defining a locating surface to locate the beams.

2. The invention according to claim 1 in which the support surface is spaced from the locating surface a distance sufficient to accomodate between the deck and the beams means for heating plants.

3. The invention according to claim 1 in which the ledge means and the upright portion define a first channel for receiving the ends of the beams.

4. The invention according to claim 3 in which the ledge means and the upright portion define a second channel for receiving the periphery of the deck.

5. Framework shaped to surround a supporting deck, the deck and the framework forming a bench top for a greenhouse bench, the bench top being supported by means of a scaffold in an elevated position relative to the floor upon which the bench is to be erected in use, the framework comprising:

an upright portion forming sides with a smooth exterior surface for the bench top and adapted to shield the bench top; and

ledge means defining a support surface to support the periphery of the deck and defining a locating surface to locate a plurality of beams bridging the framework and providing respective bearing surfaces for support of the bench top on the scaffold.

6. The invention according to claim 5 in which the support surface is spaced from the locating surface a distance sufficient to accomodate between the deck and the beams means for heating plants.

7. The invention according to claim 6 in which the ledge means comprise at least two spaced ledges, an upper one of which defines said support surface and a lower one of which defines said locating surface.

8. The invention according to claim 5 in which the ledge means and the upright portion define a first channel for receiving the ends of the beams.

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9. The invention according to claim 8 in which the ledge means and the upright portion define a second channel for receiving the periphery of the deck.

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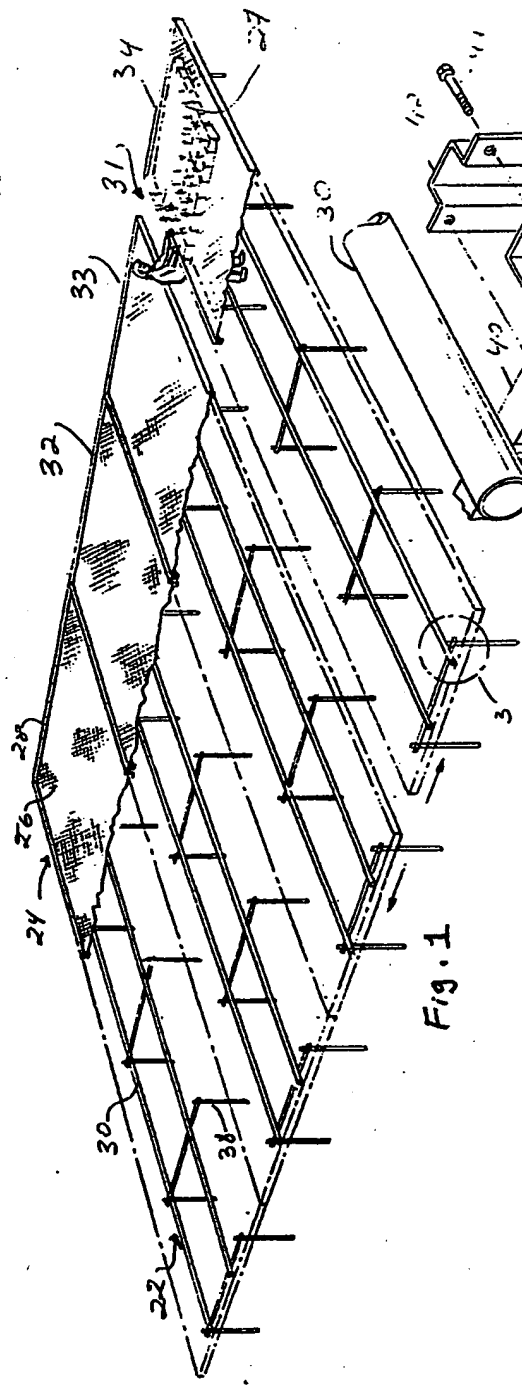


Fig. 1

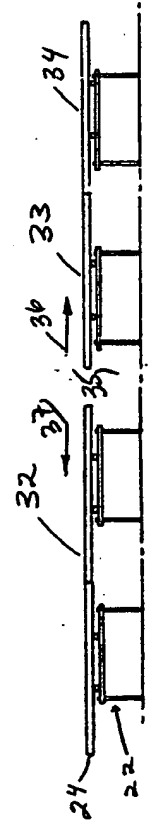


Fig. 2

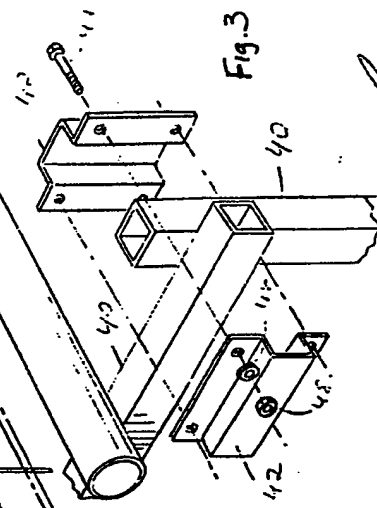


Fig. 3



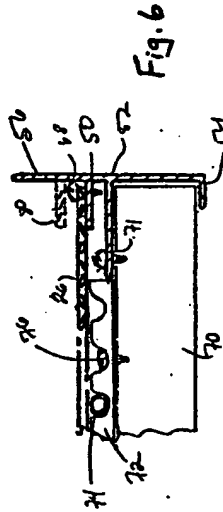


Fig. 6

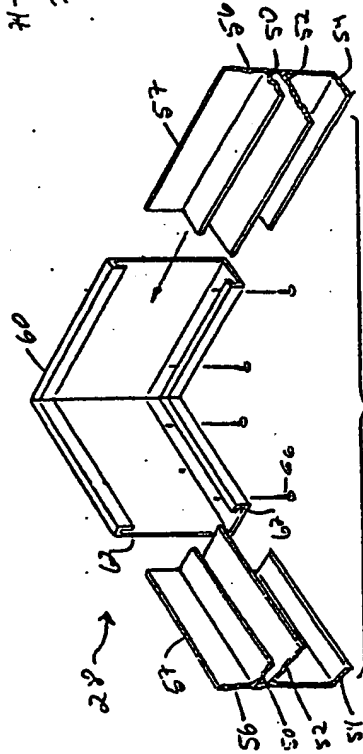


Fig. 5

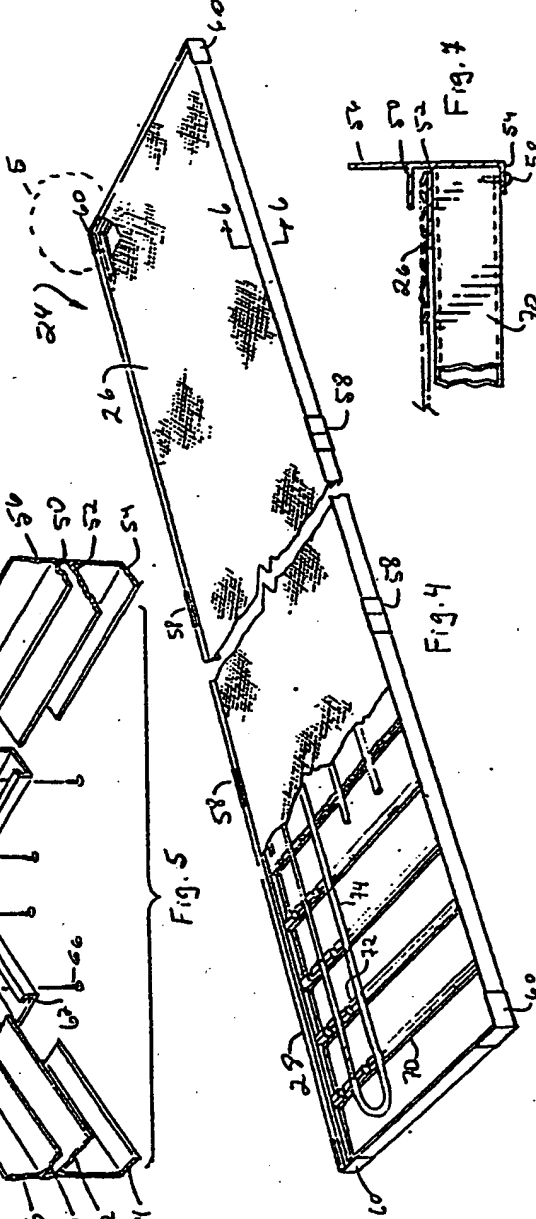


Fig. 4

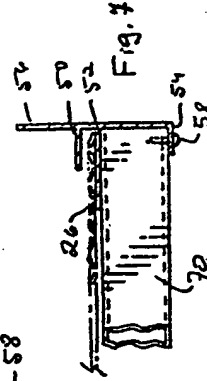


Fig. 7

DERWENT-ACC-NO: 1989-316058

DERWENT-WEEK: 198944

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TITLE: Framework for greenhouse bench top - has support deck  
with beams bridging top to form bearing surface

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PATENT-ASSIGNEE: VARY INDS 1982 LTD[VARYN]

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INT-CL (IPC): A01G009/00

ABSTRACTED-PUB-NO: CA 1260270A

BASIC-ABSTRACT:

The greenhouse bench has a bench top and a scaffold to support the bench top in an elevated position relative to the floor upon which the bench is to be erected in use. The bench top includes a supporting deck and beams bridging the bench top to provide respective bearing surfaces for support of the bench top on the scaffold.

A framework shaped to surround the deck comprises an upright portion forming sides with a smooth exterior surface for the bench top and adapted to shield the bench top. There is a ledge defining a support surface to support the periphery of the deck and defining a locating surface to locate the beams.

ADVANTAGE - Allows heating of plant roots.

CHOSEN-DRAWING: Dwg.0/6

TITLE-TERMS: FRAMEWORK GREENHOUSE BENCH TOP SUPPORT DECK BEAM  
BRIDGE TOP FORM  
BEARING SURFACE

DERWENT-CLASS: P13

SECONDARY-ACC-NO:

Non-CPI Secondary Accession Numbers: N1989-240709